

ABSTRACTS

OF THE

METEOROLOGY OF 1874,

CONDENSED FROM THE RECORDS OF THE

Kansas State Agricultural College,

BY

Prof. WM. K. KEDZIE.

~~GEOLOGY~~

MANHATTAN, KANSAS:
PRINTED AT THE OFFICE OF THE NATIONALIST.

1875.

55 1.5
X 23
pages



Meteorology of 1874.

To the mind of the Kansas student there is perhaps no more fascinating, and certainly no more difficult problem than that which is afforded him in the meteorological phenomena of our State. To determine even an approximation to the laws which govern the manifestations of these phenomena is a task beset with most complex difficulties. The ranges or extreme limits, both of barometric pressure and rain deposit, are, as the most casual observer must have noted, immense. Our ranges of temperature are also frequently quite startling, though by no means so great as in many eastern localities in higher latitudes. Indeed, it would seem as if, in many respects, an unwonted freedom were allowed in the display of these fundamental phenomena which make up a State's climatology. There is perhaps a no more unique experience than that which is in store for every observer who comes among us with ideas adjusted to the well regulated meteorology of many of our eastern States. Barometrical indications which long experience had taught him to regard as perfectly infallible, he here finds to be quite the reverse; and through many startling experiences he awakens to the fact that effects which he had heretofore regarded as following primary causes in quite simple relations, are here so modified in their nature by contingent or secondary causes that the problem becomes complex and intricate in the extreme.

All these things teach us the absolute importance of accurate, extended and long continued observation of these meteorological phenomena of our state. A wide variation is offered in the climatology of the extreme western and eastern portions of Kansas. Especially is this true of temperature and rain deposit; the total amount of the latter upon our western border being, in all probability, barely half that received by the eastern counties. Kansas has already unnecessarily suffered in her good reputation for veracity by the persistent misstatement of these matters to our Eastern friends and patrons. The records of the rain deposit of

~~p 2969~~
71853

the meteorological stations at Leavenworth and Lawrence are beyond doubt accurate and trustworthy in themselves. But when these records are proffered to Eastern inquirers as typical examples of the "average rain deposit of Kansas," nothing but harm can result from the false and injurious inferences which would naturally follow. The abundant advantages which Kansas offers to the farmer and horticulturist alike, both in soil and climate are so well attested throughout the nation that nothing can be added to her good name by ambitious exaggeration, nor by the persistent substitution of half truths for whole ones. Until an abundance of reliable data from all portions of the State has been accumulated, in the form of carefully prepared records of many years of patient observation, it will be folly for us who are interested in the solution of this problem, as a matter of scientific interest, to attempt any hypotheses. The ludicrous failures which have already followed such attempts on the part of certain pseudo-scientists, should prove an ample caution. It will be many years before we may hope to obtain a knowledge of the laws governing our own climatology which shall at all approximate in fullness and accuracy that which we already possess of the meteorology of many European territories, or even of many Eastern localities of our own continent. Our work and duty, for many years to come, is patiently to observe and faithfully to record the results of these observations. It is only upon a sure foundation of such accumulated data that we may safely attempt any deductions or hazard any probabilities. It is to this end that the following abstracts of the meteorology of 1874 as compared with the fifteen preceding years are here included in compact tabular form, convenient for reference and for comparison.

The season of 1874 will be long memorable in the minds of the farmers and fruit growers of Kansas as a year of unprecedented disaster. As a year of drouth and excessive temperature it is only surpassed by the memorable season of 1860. But the drouth itself was by no means so disastrous in its effects as in many localities east of the Mississippi. And the insect ravages which immediately succeeded it were matters of so much more serious importance that the anxieties occasioned by the first disaster were overshadowed by the magnitude of the latter. The meteorological records of the State Agricultural College extend through a period of

sixteen years, from 1859 to 1874, inclusive. It is only, however, since September 1st, 1873 that well authenticated observations of the hygrometer have been recorded. It is for this reason that the estimates of relative humidity and of the force or pressure of vapor in inches are purposely omitted—as these are interesting and valuable only when capable of comparison through a period of years. In the following table will be found an abstract of the more important portions of the records for the past year 1874 at this station—*giving, by months, maximum and minimum temperatures, with dates; average temperature of months; maximum, minimum and mean of barometrical records; per cent. of cloudiness; rain or melted snow, in inches; snow: number of stormy days; and average of coldest or warmest day of month, as indicated in the last column by the letters C or W.*

MONTHS.	Coldest or Warmest Day		No. of Stormy Days		Snow in inches		Rain or Melted Snow		Per Cent. of Cloudiness.....		Mean Barometer		Minimum Barometer		Maximum Barometer		Average Temperature..		Minimum Temperature..		Maximum Temperature..	
January	4th,	8°	7		3 $\frac{3}{4}$		.50		57		29.44	28.10	28.72	23d,	60°	27°42	-6°	23d,	60°	3d,	60°
February	23d,	10 $\frac{3}{4}$	5		13 $\frac{1}{4}$		1.20		50		29.20	28.10	28.77	14th,	48°	25°73	0°	24th,	48°	14th,	48°	
March	7th,	27° $\frac{1}{4}$	6		3		30		55		29.14	28.18	28.64	17th,	68°	37°97	18°	10th,	68°	17th,	68°	
April	30th,	71°	6		.....		1.40		65		29.14	28.46	28.75	30th,	84°	47°33	24°	9th,	84°	30th,	84°
May	24th,	81 $\frac{2}{3}$	8		.....		2.98		49		29.01	28.11	28.80	26th,	93°	40°69°13	40°	3d,	93°	26th,	93°
June	8th,	85° $\frac{2}{3}$	8		.....		4.31		42		28.04	28.36	28.76	8th,	94°	73°	47°	11th,	94°	8th,	94°
July	25th,	96 $\frac{2}{3}$	2		.....		.18		27		28.93	28.44	28.77	25th,	110°	83°13	57°	10th,	110°	25th,	110°
August	9th,	94° $\frac{2}{3}$	4		.....		25		34		28.90	28.44	28.71	5th,	109°	83°69	58°	29th,	109°	5th,	109°
September	1st,	81° $\frac{2}{3}$	9		.....		4.53		49		29.00	28.48	28.74	1st,	98°	65°60	39°	14th,	98°	1st,	98°
October	25th,	71° $\frac{1}{4}$	4		.....		.22		39		29.18	27.97	28.81	4th,	84°	57°	15°	30th,	84°	4th,	84°
November	18th,	17°	7		11 $\frac{1}{2}$		2.12		57		29.28	28.28	28.78	6th,	78°	39°18	3°	19th,	78°	6th,	78°	
December	17th,	18°	4		4		.67		47		29.32	28.46	28.82	2d,	58°	28th,	0°	28th,	58°	2d,	58°	

From the above table it will be seen that the average temperature of the entire year of 1874 is $53^{\circ}42$ which is just $^{\circ}02$ below the average annual temperature of this section for the past fourteen years. The maximum temperature of the year, it will be seen, was July 25th, 110° : minimum temperature, January 23d, -6° . The range of temperature for the year is, therefore, 116° . Warmest day, also upon July 25th, when the average temperature was $96^{\circ}\frac{2}{3}$. Maximum barometer, 29.44 inches: Minimum barometer, 27.97 inches; Range of barometer, 1.47 inches. Average per cent. of cloudiness 47. Total rain and melted snow for the year, 18.66 inches, which is 8.92 inches below the average rain fall at this station for the past fourteen years. Total amount of snow $35\frac{3}{4}$ inches.

In the following table, is presented the characteristics of the meteorology of 1874 by seasons. In this is, of course, included, as a part of the winter season, the month of December 1873. In this table is given the average temperature of each season; maximum and minimum temperatures; mean barometer; snow fall; rain and melted snow, in inches; number of stormy days.

SEASONS.	Average Temperature..	Maximum Temperature..	Minimum Temperature..	Mean Barom- eter.....	Snow	Rain or Melt- ed Snow, in inches.....	Number of Stormy Days.
Winter	27°41	65°	-6°	28.74	25½	3.37	23
Spring.....	51°47	93°	18°	28.73		4.68	20
Summer	79°94	110°	47°	28.74		4.74	14
Autumn	53°92	98°	3°	28.77	11½	6.87	20

In the following table is presented the average temperature by months, as recorded at this station for a period of fourteen years. The records of the years 1865-6 being unavoidably imperfect are here intentionally omitted.

MONTHS.		1874	1873	1872	1871	1870	1869	1868	1867	1864	1863	1862	1861	1860	1859
January	.....	27.42	19.71	25.18	28.78	27.73	30.77	18.43	22.45	23.97	36.09	18.23	24.86	23.13	31.95
February	.....	25.73	30.69	32.86	35.97	34.07	31.32	27.71	32.32	32.17	30.07	24.13	35.88	32.60	33.90
March	.....	37.97	42.47	38.71	47.22	36.20	35.68	49.42	24.76	38.35	47.01	38.57	42.59	52.44	46.86
April	.....	47.33	47.80	56.63	59.97	53.48	47.13	46.55	50.03	48.28	61.18	50.82	56.04	56.16	56.57
May	.....	69.13	62.84	65.68	67.21	65.81	58.04	67.06	59.18	64.79	79.39	69.12	64.93	65.66	64.45
June	.....	73	76.55	75	77.47	74.62	66.49	74.29	73.92	75.77	78.94	74.11	79.13	81.83	75.13
July	.....	83.13	77.35	78.69	79.35	84.92	73.16	83.69	75.71	81.96	76.13	80.65	78.83	88.78	82.20
August	.....	83.69	78.81	77.74	76.25	72.91	76.03	76.80	77.77	78.32	78.63	70.84	78.81	85	78
September	.....	65.60	66.37	66.24	67.22	68.33	61.90	60.73	69.88	70.85	73.18	69.23	69.03	72.56	66.87
October	.....	57	51.99	52.15	57.60	56.61	44.83	53.06	58.88	45.98	48.26	57.56	56.59	55.68	54.40
November	.....	39.18	42.13	34.08	36.98	45.61	37.26	38.10	45.10	36.56	38.15	44.08	41.35	37.83	45.95
December	.....	31.90	29.10	21.07	24.73	30.07	30.15	25.30	35.91	28	25.72	38.55	32.53	33.44	21.75

From the foregoing table it will be seen that the highest average temperature was for ~~January~~ 1860—88°78; that the lowest average temperature was for January 1862—18°23.

July

The following table presents the average temperature of each month for the past fourteen years :

MONTHS.	Average Temperature
January	25°62
February	31°39
March	41°52
April	52°73
May	65°95
June	74°87
July	80°34
August	77°83
September	67°71
October	53°13
November	40°17
December	29°16

In the following table is included the average annual temperature of fourteen years, with the amount above or below the average for the whole period 53°44, as indicated by the plus or minus signs.

YEARS.	Mean Temperature.	Above or be- low average for 14 Years.
1874.....	53°42	—°02
1873.....	52°14	—1°30
1872.....	52°86	—°58
1871.....	54°89	+1°45
1870.....	54°19	+°75
1869.....	49°44	—4°00
1868.....	51°76	—1°68
1867.....	52°16	—1°28
1864.....	52°08	—1°36
1863.....	55°39	+1°95
1862.....	52°99	—°45
1861.....	55°04	+1°60
1860.....	57°01	+3°57
1859.....	54°83	+1°39

By the above table it will be seen that the warmest season was that of 1860, presenting an annual temperature of 3°57 above the average: that the coldest season was that of 1869, presenting an annual average temperature 4° below the average.

In the following table is included the amount of rain and melted snow in inches, by months for the years 1859 to 1874, omitting, as before the years 1865-6.

MONTHS.														
	1874	1873	1872	1871	1870	1869	1868	1867	1864	1863	1862	1861	1860	1859
January .....	.50	.87	.13	.53	.05	1.15	.30	.65	.44	.66	1.50	1.35	.05	1.50
February	1.20	.30	.48	2.48	.00	1.17	.18	2.01	1.10	2.30	.12	.00	1.84	.61
March .....	.30	.71	.92	1.02	1.45	1.06	.93	.63	2.12	.00	.00	.00	.00	2.88
April	1.40	1.67	2.06	3.90	.50	2.20	1.96	2.44	1.68	9.12	3.63	2.00	.12	2.56
May	2.98	8.54	6.81	5.07	.00	1.12	1.38	3.59	2.29	3.13	3.18	3.76	1.13	9.42
June	4.31	7.78	1.73	2.05	.79	8.85	3.46	5.65	2.06	5.95	1.37	8.20	2.69	3.57
July .....	.18	2.84	8.92	5.03	2.98	6.27	4.70	5.42	3.02	4.53	3.83	6.08	2.09	4.99
August .....	.25	1.64	5.32	4.25	5.21	2.43	.00	.70	1.84	6.21	2.85	1.39	3.00	6.84
September	4.53	1.85	5.70	1.92	4.57	1.83	5.72	3.50	2.30	.73	4.15	8.06	.35	1.82
October.....	.22	4.20	2.76	1.20	5.06	.43	2.51	.91	.68	2.40	1.62	2.02	.42	64
November	2.12	.82	0.00	1.96	.13	1.19	2.17	.49	1.61	2.23	1.70	.70	1.58	1.20
December.....	.67	1.67	.95	.35	.45	.52	.81	.51	1.11	2.17	2.25	1.00	.50	20

From the above table it will be seen that the greatest rainfall of any month was for May 1859—9.42 inches.

The following table gives the average amount of rain and melted snow for each month for a period of fourteen years :

MONTHS.	Average Rain and melted Snow
January.....	.69
February.....	.98
March.....	.86
April.....	2.45
May.....	4.03
June.....	4.17
July.....	4.35
August.....	3.22
September.....	3.36
October.....	1.79
November.....	1.28
December.....	.94

In the following table is presented the total amount of rain and melted snow for each of the fourteen years, with the amount above or below the average for this period, 27.62 inches, as indicated by the plus or minus signs :

YEARS.	Total Rain- fall.	Above or below Average.
1874.....	18.66	—8.92
1873.....	32.89	+5.27
1872.....	35.78	+8.16
1871.....	28.86	+1.24
1870.....	21.19	—6.43
1869.....	28.22	+60
1868.....	24.12	—3.50
1867.....	26.50	—1.12
1864.....	20.25	—7.37
1863.....	39.43	+11.81
1862.....	26.20	—1.42
1861.....	34.56	+6.94
1860.....	13.72	—13.90
1859.....	36.23	+8.61

From the above table it will be seen that the heaviest rainfall was for the year 1863, when it was 11.81 inches above the average: that the lowest amount was for the year 1860, when it was 13.90 below the average.

Thus it will be seen that the three years of drouth for this period are those of 1874-70-60.

In the following table are compared with the average the maximum temperature, average temperature, and rainfall for these three years.

YEARS.	Maximum Temperature..	Average Temperature..	Rain and Melted Snow.
1874.....	110°	53°42	18.66
1870.....	100°	54°19	21.19
1860.....	115°	57°01	13.72
Average		53°44	27.62

From the above table it will be seen that the year 1860 was by far the most severe and disastrous, both in its excessive drouth and heat. It will be noticed that these three years present very marked and essential differences in their characters. This diversity is still more strongly exhibited in the following table, *giving the rainfall for the five most important months for the years 1874-70-60, as compared with the average for these months:*

MONTHS.	1874.....	1870.....	1860.....	Average ...
April.....	1.40	.50	.12	2.45
May.....	2.98		1.13	4.03
June	4.31	.79	2.69	4.17
July.....	.18	2.98	2.09	4.35
August .....	.25	5.21	3.00	3.22

The above table will thus, to a good extent, account for the wide difference in the essential characters of the years 1874 and 1860. That not only was the drouth of 1860 by very far the most severe, presenting hardly one-half the average rainfall, but that it prevailed with especial severity during the three very important

months of April, May and June, thus cutting off all crops for the entire year; while, on the other hand, during the past season of 1874, the rain deposit for these three important months was reasonably abundant, the drouth not commencing until toward the latter part of June and continuing with the greatest severity during the months of July, August, and a portion of September. While corn, the staple crop of the State, was thus almost wholly cut off, wheat and other small grains reached a vigorous maturity.



3 0112 072856096